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Hangzhou Future Power Technology CO., LTD

Polymer Li-ion Recharged Battery

Product Specifications

Model : FT401319P/50mAh

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1. Scope

This specification shall be applied to be delivered for Hangzhou Future Power Technology Co., Ltd's product.

2. Product Type and Product Model

2.1 Type: Polymer Li-ion Recharged Battery

2.2 Model: FT401319P

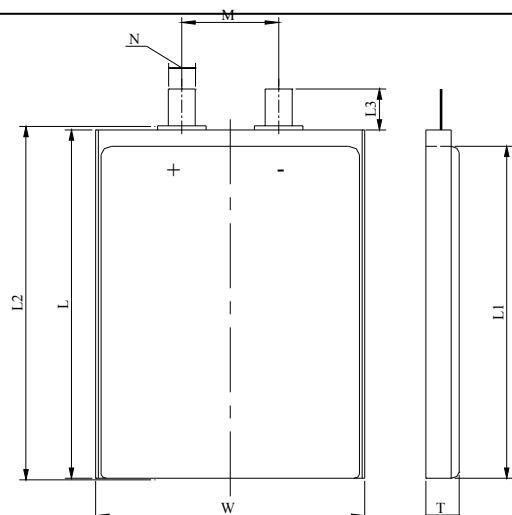
3. Product Basic Characteristics

No	Item	Characteristics
3.1	Rated Capacity	50mAh
3.2	Nominal Voltage	3.7V
3.3	Charge Limited Voltage	4.20 ^{+0.03} _{-0.02} V
3.4	Discharge Cut-off Voltage	3.0V
3.5	End-of-charge Current	0.02C
3.6	Standard Charge	Charge with 1C(50mA) up to Limited Voltage , Charge with limited Voltage up to end-of-charge current.
3.7	Standard Discharge	Using 0.2C(10mA) constant current discharge to the Discharge Cut-off Voltage.
3.8	Maximum Continuous Charge Current	1C (50mA)
3.9	Maximum Continuous Discharge Current	1C (50mA)
3.10	Operating Temperature Range	Charge 0 ~ 45℃
		Discharge - 20 ~ 60℃
	Storage Temperature Range	-20 ~ 60℃
3.11	Operating And Storage Humidity Range	65±20% RH
3.12	Weight	Less than 2.0g

4. External Dimension

Item	Dimension (mm)
T	Max 4.0
W	Max 13.0
L	19.0±0.5
L1	Max 15.0
L2	Max 19.5
L3	8.0±1
M	5.5±1
N	2.0±0.2

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5. Outside Appearance

It shall be free from any defects such as remarkable scratches, breaks, cracks, discoloration, leakage, or middle deformation.

6. Basic Electrical Characteristics

No.	Items	Criteria	Test Method
6.1	Open Circuit Voltage	3.75V~3.90V	Measure with voltmeter.
6.2	Internal Impedance	$\leq 850\text{m}\Omega$	Measure cells using an alternate current impedance meter at 1kHz .
6.3	Rated Capacity (0.2C ₅ A)	$\geq 50\text{mAh}$	Discharged after the standard charged cells rest 10min Test can be discontinued when more than 5h. Three cycles are permitted.
6.4	1C ₅ A discharge capacity	$\geq \text{Rated Capacity} \times 95\%$	Discharged after the standard charged cells rest 10min Test can be discontinued when more than 57min. Three cycles are permitted.
6.5	Temperature Characteristics	1. Outside Appearance: No deformation、ruptures nor leakage. 2.Discharge Capacity: 60℃: $\geq 95\% \times \text{initial capacity}$; 0℃: $\geq 80\% \times \text{initial capacity}$; -20℃: $\geq 60\% \times \text{initial capacity}$	Measured the 0.2C ₅ A capacity at (20±2)℃ as the initial capacity. Stored the recharged cells for 16 hrs at -20 ± 2℃, 2h for 0 ± 2℃, 60 ± 2℃, and then 0.2C ₅ A discharged at this temperature, Checked the cells' appearance after rest for 2 hrs at room temperature.
6.6	Storage Characteristics	Retention Capacity: $\geq 85\% \times \text{initial capacity}$	Measured the 0.2C ₅ A capacity at (20±5)℃ as the initial capacity. Stored the recharged cells for 28 days at 20 ± 5℃ and then rest for 2 hrs at room temperature, 0.2C ₅ A discharged after checked the cells' appearance.

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6.7	Cycle Life (20 °C)	Capacity \geq initial capacity \times 80%	1C discharged after 1C ₅ A full charges at 20 \pm 5 °C. Carry out 300 cycles
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Remark 1 Standard charge: 0.2C₅A charge up to charge limited voltage at (20 \pm 5)°C. Charge with limited voltage up to end of current. It is the same to the next content

7.Safety Characteristics

No.	Items	Criteria	Test Method
7.1	Overcharge Characteristics	The maximum Temperature: $\leq 150^{\circ}\text{C}$ Appearance: No rupture, fire, smoke, nor leakage.	Charged the cells at 3C ₅ A current (20 \pm 5)°C with a voltage limit of 4.8V at after 1C ₅ A discharged to cut of voltage .Test can be terminated until constant voltage charge time is more than 7 hrs.
7.2	Over-discharge Characteristics	The maximum Temperature: $\leq 150^{\circ}\text{C}$ Appearance: No rupture, fire, smoke, nor leakage.	After discharged to cut of voltage with 1C ₅ A discharged cells at 3C ₅ A current to -10V at (20 \pm 5)°C or until the cell voltage indicates a positive - Δ V or discharge-time is more than 1.5 hrs.
7.3	Short-circuit Characteristics	The maximum Temperature: $\leq 150^{\circ}\text{C}$ Appearance: No rupture, fire, smoke, nor leakage.	Rest cells for 30min at 60 \pm 2° C after standard charged. Connect between Cell terminals with copper lead (electric resistance: 50m Ω or less).Test can be terminated when surface temperature is less 10° C higher than environment temperature.
7.4	Hot Oven Characteristics	The maximum Temperature: $\leq 200^{\circ}\text{C}$ Appearance: No explode.No fire.	The cell is to be heated in a gravity convection or circulating air oven after standard charged at 20 \pm 5° C The temperature of the oven is to be raised at a rate of 5 \pm 2° C/min. The oven is to remain for 30 minutes at 130 \pm 2° C before the test is discontinued.
7.5	Impact Test	No fire, explode. Electrolyte leakage permitted.	The cell is to be placed on a flat surface after standard charged at 20 \pm 5° C. A 5/8inch (15.8mm) diameter bar is to be placed across the center of the sample. A 20 pound (9.1kg) stainless steel bar is to be dropped from a height of 24 inch (610mm) onto the sample.

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7.6	Crush Test	No fire, explode. Electrolyte leakage permitted.	After standard charged at $(20\pm 5)^{\circ}\text{C}$, the cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram with a 1.25inch (32mm) diameter piston. The crushing is to be continue until a pressure reading of 2500 psig (17.2MPa) is reached on the hydraulic ram, applied force of 3000 pounds(13kN). Once the maximum pressure has been obtained it is to be released.
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Remark 2 All safety characteristics are carried out by specialized personnel familiar with Li-ion knowledge or under instruction of our technical personnel after detailed consultation.

8. Reliability Characteristics

No.	Items	Criteria	Test Method
8.1	Static Humidity and Temperature Characteristics	Retention Capacity: $\geq 80\% \times \text{initial capacity}$ Recoverable Capacity: $\geq 85\% \times \text{initial capacity}$ Appearance: No leakage, damage, smoke, rupture.	Measured the $1C_5A$ capacity at $(20\pm 5)^{\circ}\text{C}$ as the initial capacity. Stored the recharged cells for 2 days at $40 \pm 2^{\circ}\text{C}$ and 90%-95%RH, then rest for 2 hrs at room temperature. $1C_5A$ discharged after checked the cells' appearance. Measured recoverable $1C_5A$ discharge capacity with 3 cycles.
8.2	Vibration Characteristics	OCV Variation: $\leq 0.05V$ Recovery capacity: $\geq 95\% \times \text{rated capacity}$. Appearance: No fire, leakage, explode, rupture	Measured the initial OCV after standard charged at $20\pm 5^{\circ}\text{C}$. Vibrate the cells for 30 minutes on each direction at room temperature in 10min. Amplitude: 1.6mm, (p-p) Vibration: 10-60Hz (sweep 1 oct/min) Direction: X, Y, Z Then measured OCV, $1C_5A$ discharged to cut of voltage.
8.3	High Temperature Storage	Recovery capacity: $\geq 80\% \times \text{initial capacity}$. No leakage.	Measured the $1C_5A$ capacity as the initial capacity. Stored the recharged cells for 48 hrs at $70 \pm 2^{\circ}\text{C}$, then rest for 2 hrs at room temperature. Quickly discharged after checked the cells' appearance. Measured recoverable $1C_5A$ discharge capacity. Three cycles are permitted.
8.4	Drop	OCV Variation: $\leq 0.05V$; Retention Capacity: $\geq \text{Rated capacity}$;	Measured $1C_5A$ capacity as the initial capacity. Measured the initial OCV and impedance after standard charged. Drop the cells from 1.0m above onto hard wood (thickness: 18~20mm) frontage and reverse side at

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	Appearance: No fire, leakage, explode, rupture	room temperature, then measured OCV . Repeat this drop cycle 3 times. Then measured retention capacity.
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9. Protection Function

If a Polymer Li-ion Battery is subjected to a voltage higher than the allowable voltage or is charged with an excessive current, the electrolyte may decompose, resulting possibly in degassing or compromising cell safety. If cell voltage decreases below 2.3V approx, cell performance may deteriorate. Therefore, PTC must be equipped protection circuit that can prevent overcharge, over-discharge, and over-current. PTC is connected with protect electric circuit. As far as possible pastes in the cell's can.

10. Guarantee Period of Quality

Guarantee period of quality is 12 months after sold.

11. Parameter of PCB(N310A)

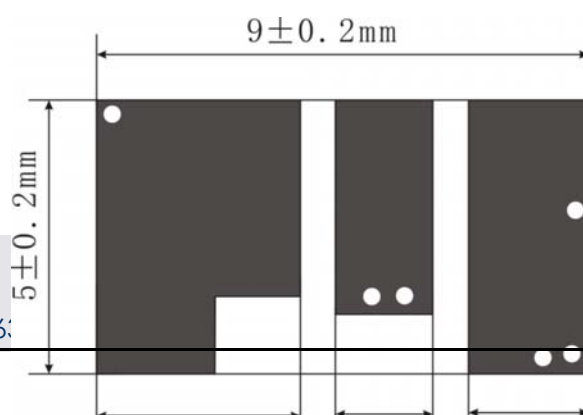
11.1 List of Parameter

Parameter	Min	Typ.	Max	Unit
Overcharge Detection Voltage	4.255	4.28	4.305	V
Overcharge Detection Delay Time	0.96	1.2	1.4	ms
Overdischarge Detection Voltage	2.95	3.00	3.05	V
Overdischarge Detection Delay Time	115	144	173	ms
Over Current Defection	1.5	2.2	4	A
Over Current Detection Delay Time	7.2	9	11	ms
short circuit Detection Delay Time	220	320	380	μ S
Current Consumption in Normal		3	7	μ A
Impedance		50	60	m Ω

11.2 List of PCB BOM

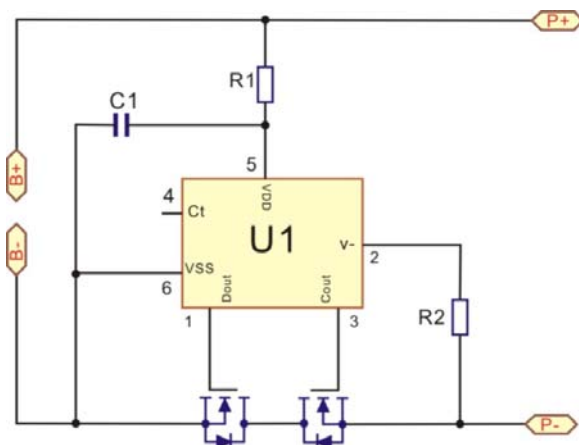
Item	Reference	Description	Type	Qty	Mftr
1	U1	CONTROL IC	S-8261 G3J	1	SEIKO
2	U2	MOSFET	ECH8601	1	SANYO
3	R1	RES	470 Ω ±5% 0603	1	
4	R2	RES	2K Ω ±5% 0603	1	
5	C1	CAP	0.1 μ F±20% 0603	1	
6		PCB	EM-N310A	1	

11.3 Dimension of PCB

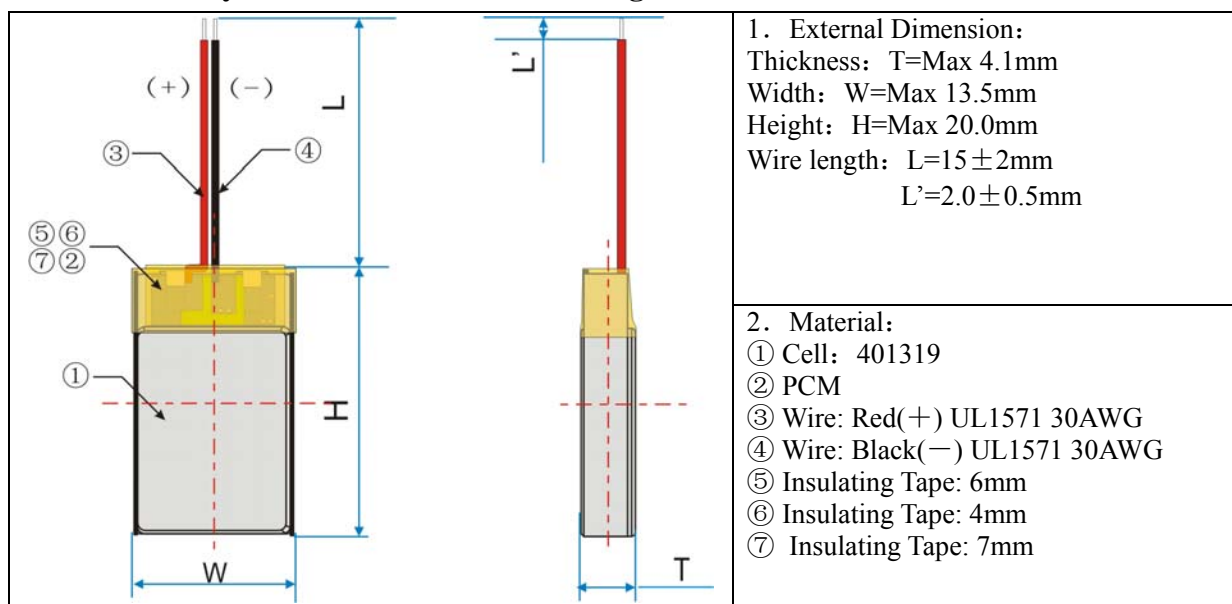


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11.4 Circuit Diagram



12. PACK Battery External Dimension Drawing



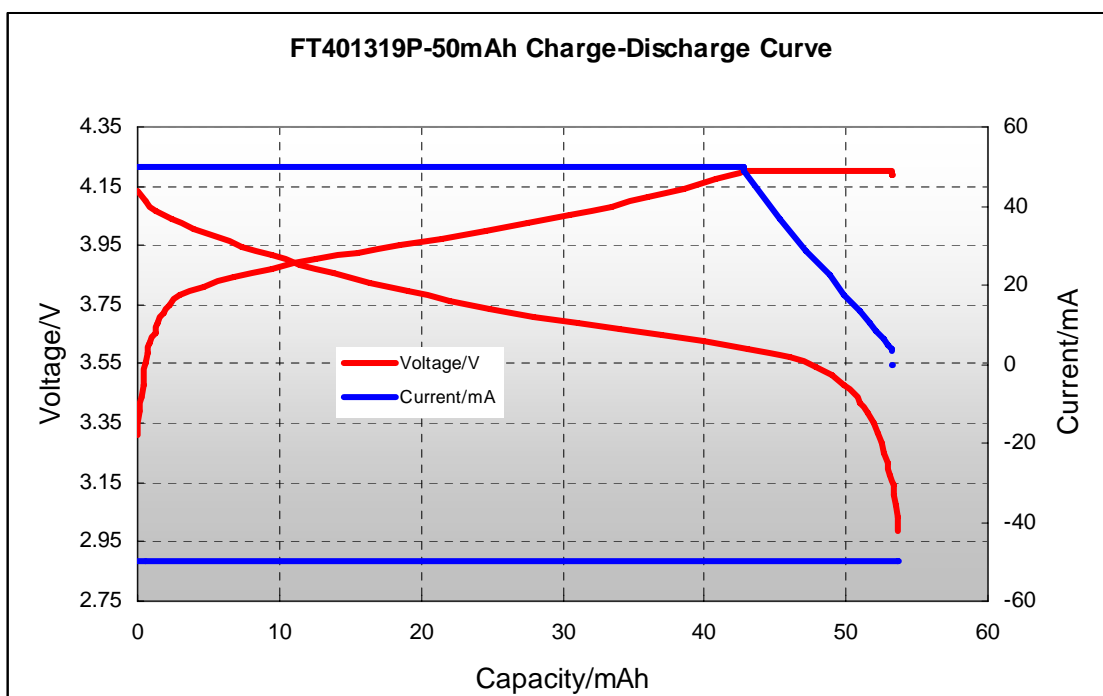
13. PACK Battery Voltage & Impedance

Voltage : 3.7V~3.9V

Impedance: $\leq 950\text{m}\Omega$

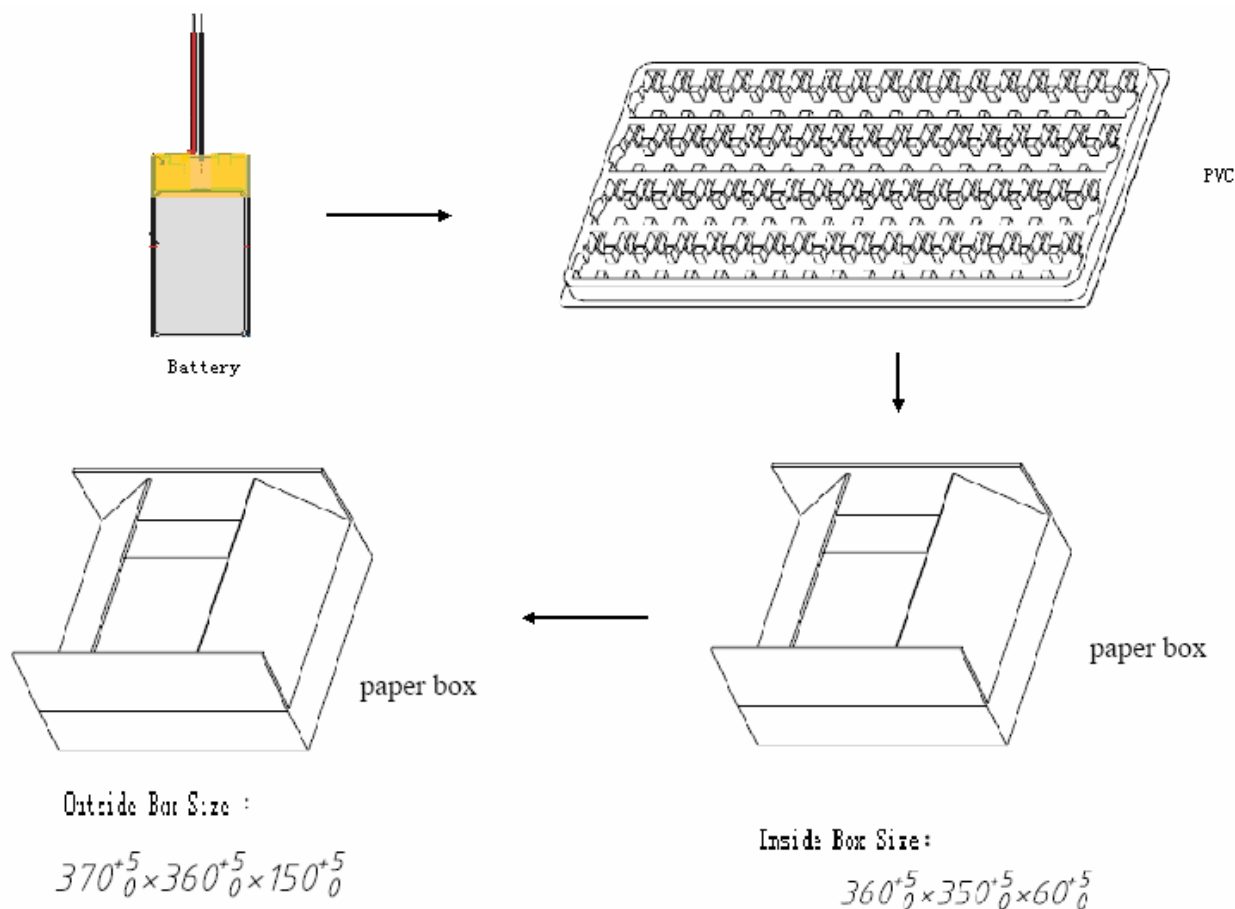
14. Charge-Discharge Curve

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15.Packaging

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Note: 68pcs/layer; 10 layers/inside box; 2 inside boxes/outside box; 1360pcs/outside box

16. Matters needing attention

Strictly observes the following needing attention. Future power will not be responsible for any accident occurred by handling outside of the precautions in this specification.

! Danger

- Strictly prohibits heat or throw cell into fire.
- Strictly prohibits throw and wet cell in liquid such as water、gasoline or drink etc.
- Strictly prohibits use leave cell close to fire or inside of a car where temperature may be above 60°C. Also do not charge / discharge in such conditions.
- Strictly prohibits put batteries in your pockets or a bag together with metal objects such as necklaces. Hairpins, coins, or screws. Do not store or transportation batteries with such objects.
- Strictly prohibits short circuit the (+) and (-) terminals with other metals.
- Do not place Cell in a device with the (+) and (-) in the wrong way around.
- Strictly prohibits pierce Cell with a sharp object such as a needle.
- Strictly prohibits disassemble or modify the cell.
- Strictly prohibits welding a cell directly.
- Do not use a Cell with serious scar or deformation.
- Thoroughly read the user's manual before use, inaccurate handling of lithium ion rechargeable cell

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may cause leakage, heat, smoke, an explosion, or fire, capacity decreasing.

! Warning

- Strictly prohibits put cell into a microware oven, dryer, or high-pressure container.
- Strictly prohibits use cell with dry cells and other primary batteries, or new and old battery or batteries of a different package, type, or brand.
- Stop charging the Cell if charging is not completed within the specified time.
- Stop using the Cell if abnormal heat, odor, discoloration, deformation or abnormal condition is detected during use, charge, or storage.
- Keep away from fire immediately when leakage or foul odor is detected.
- If liquid leaks onto your skin or clothes, wash well with fresh water immediately.
- If liquid leaking from the Cell gets into your eyes, do not rub your eyes. Wash them well with clean edible oil and go to see a doctor immediately.

! Caution

- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
- Charging with specific charger according to product specification. Charge with CC/CV method. Strictly prohibits reversed charging. Connect cell reverse will not charge the cel. At the same time, it will reduce the charge-discharge characteristics and safety characteristics, this will lead to product heat and leakage.
- Store batteries out of reach of children so that they are not accidentally swallowed.
- If younger children use the Cell, their guardians should explain the proper handling.
- Before using the Cell, be sure to read the user's manual and cautions on handling thoroughly.
- Batteries have life cycles. If the time that the Cell powers equipment becomes much shorter than usual, the Cell life is at an end. Replace the Cell with a new same one.
- When not using Cell for an extended period, remove it from the equipment and store in a place with low humidity and low temperature.
- While the Cell pack is charged, used and stored, keep it away from objects or materials with static electric charges.
- If the terminals of the Cell become dirty, wipe with a dry clothe before using the Cell.
- Storage the cells in storage temperature range as the specifications, Afer full discharged, we suggest that charging to 3.9~4.0V with no using for a long time.
- Do not exceed these ranges of the following temperature ranges.
Charge temperature range : 0℃ to 45℃;
Discharge temperature range : -20℃ to 60℃.
(When using equipment)

17.Statement

If our specifications material, product process or product control system has changed, the information will be transmitted to consumer by way of written with quality and reliability data.

18. Relation Information

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